Hobbies WEEKLY

CONTENTS

October 20th, 1948 Price Threepence Vol. 107 No. 2764

A ROCKING DONKEY

WHY must we always have a rocking horse? Why not, for a change, a rocking donkey? A fair-sized toy of this nature is shown, as can be seen from the elevation at Fig. 2. It is a dual-purpose toy—one that can be rocked, or pulled along the ground.

Although the old-fashioned rocking principle has been adopted, the rockers are shaped to ensure some measure of safety in use, particularly at the rear end. As for the donkey itself, it is a simplified type, easily cut out, and consists of ten separate pieces of shaped wood, glued and nailed together, all of which, including a rocker, are plotted in 3in. squares at Fig. 1. This enables scraps of ⅞in. wood, or full 1in. thick stuff, to be utilized, and with the grain running with lengths, a very strong model is assured.

With Wheels

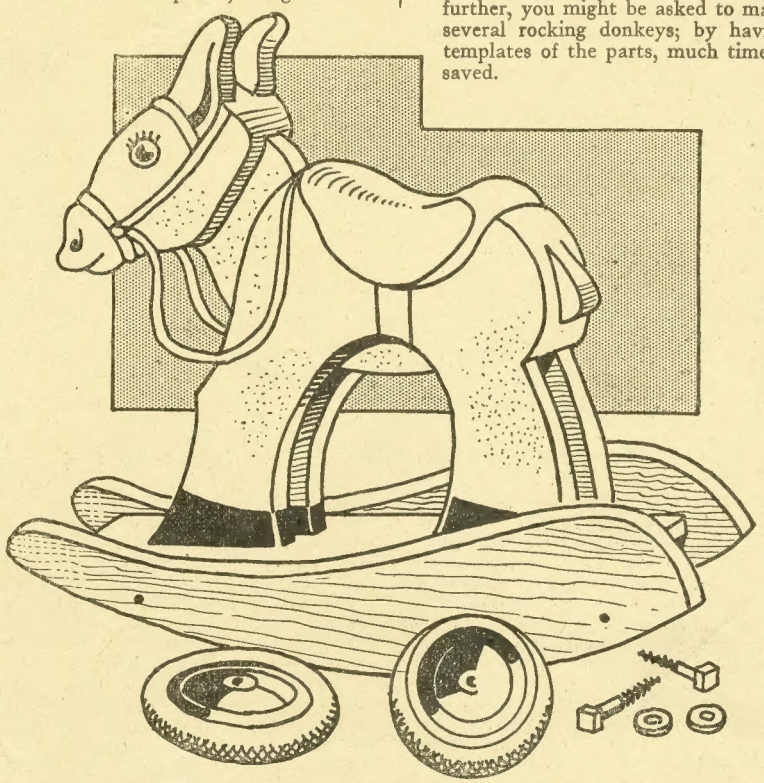
The base board is provided with axles so that 5in. or 6in. diameter rubber-tyred disc wheels can be attached, using suitable coach screws which, being square-headed, can be inserted in a jiffy with a spanner or wrench.

When completed, and coloured with bright enamels, the toy is sure to be welcome in any home where there are children. Steel disc wheels, of course, give a professional touch to the work, apart from making it free, silent, running.

To get the full-size templates of the donkey parts, it is a good idea to get some old newspaper sheets and rule them into 3in. squares, using a blue pencil. Then, with a red pencil, the outlines are carefully followed, lightly, then more heavily as the shape is obtained. The patterns are cut to the outline with scissors and laid on the wood for re-marking direct on it with the blue pencil, the edge of the paper serving as a guide.

Paper Patterns

Patterns, in paper or thin card, are very convenient. You can adjust them on the wood this way and that way until you see just how they can be arranged to use up a particular size. And by reversing your patterns, you obtain "opposite" shapes. And further, you might be asked to make several rocking donkeys; by having templates of the parts, much time is saved.



You will want a single body piece which, as indicated by the squares, needs to be about 20ins. by 10ins. You require a repeat of all the other shapes, cutting same in reverse so that the best side of the wood will be at the outside. The wood is ⅞in. or 1in. thick, and deal or pine will serve the purpose, if you possess cuttings.

Be sure to include the dotted lines on your patterns, as these serve as a form of guide when assembling the

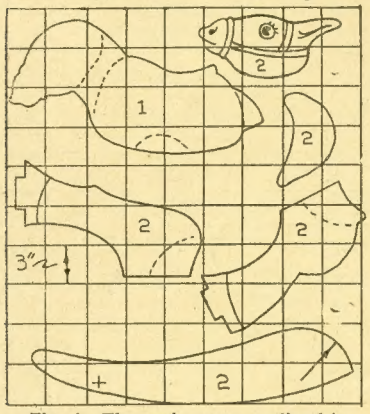


Fig. 1—The main parts outlined in 3in. squares

parts together. The wood is cut to shape with a bow-saw or keyhole saw, keeping the cutting as vertical as possible.

When all parts are cut out, select the body piece and fix a front leg and hind leg to one side of it, then at the other side. Add the head pieces, then the saddle pieces, one at each side. See that the parts are in alignment before setting the work aside to set.

The Rockers and Base

Meantime, spokeshave the edges of the rockers neatly. The base board, at Fig. 2, is cut out, using ⅞in. wood. Check the mortise positions with the tenons on the legs of the model donkey to ascertain a true fit.

The base is only 6ins. wide. If desired, however, it could be made 8ins. wide. The extra inches will prevent the toy toppling over on its side easily. When made narrow, the feet of the user can rest on the floor. The saddle is only 14ins. or thereabouts from the ground, and 16ins. when the wheels are fitted on.

Glue and screw axles to the base board as per dotted lines. The axles can be 6ins. (or 8ins.) by 1in. by about 2ins. The rockers are then attached to the base, using screws, after which the underside of the axles are bevelled to conform with the arc of the rockers.

Wheel Fixing

Disc wheels, as previously mentioned, are affixed with coach screws—not carriage bolts, please note. Coach screws are made in a variety of sizes. They have a coarse, wood screw thread, with a square head. Part of the shank, like wood screws, is plain, and this part of the screw forms a good bearing for the hubs of the metal wheels. You should use fairly long coach screws—not less than 4ins.

A lot depends on the width of the wheel hubs and the diameter of the hub holes. The screws should be a neat, free fit. Drill receiving holes in the wood so the screws drive in with a minimum of trouble, using a spanner or wrench. Have suitable metal washers between the head of the screws and the hubs of the wheels, this also applying to the rockers and the hubs.

Touch Up the Donkey

The donkey requires to be trimmed up here and there to make it smooth and presentable. You will need a rasp and coarse and fine glasspaper. The saddle needs to be rounded over at the top to make it comfortable. You have five thicknesses of wood to work on, and a fairly decent curvature can be obtained, as can be seen in the illustration of the finished toy.

The donkey's head cannot be left square. You will need to rough it into shape. A carver could make a good job of it, but so can you, if you remember that simplicity is the keynote of the toy throughout its construction—and finish. A few corner cuts here and there, a few scallops off in other essential parts, will make a passable head. Remember that the paintwork will do much to add further realism to the model.

An Easier Method

If all this is going to mean a lot of bother to you, the head, like the hind end, can be left square-cut. The saddle, however, must be rounded over, and this, fortunately, is a much easier task for everybody. Be sure to see that no sharp edges are left on the wood. Remove the arris with coarse and fine glasspaper, then mount the donkey on its base, using glue, with

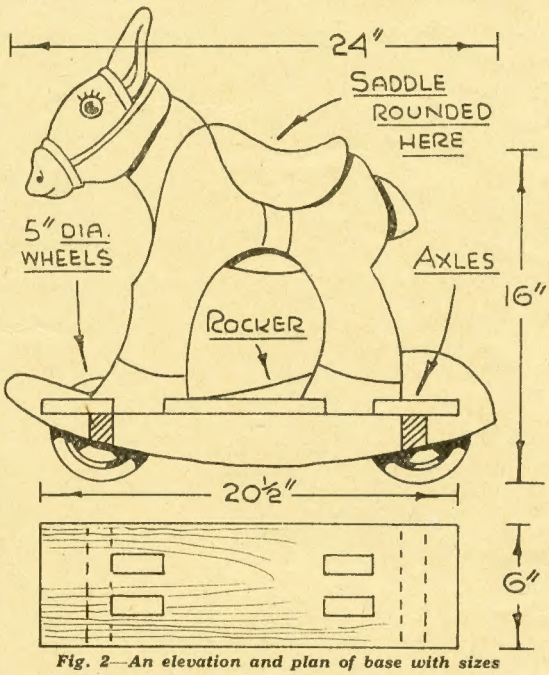


Fig. 2—An elevation and plan of base with sizes

screws driven in via the underside.

To colour the toy, use good enamel paint. The donkey can be dark grey, stippled here and there with brown. It could be done brown all over—a light golden brown, for example, and the saddle painted dark brown, the hoofs being black, with the eyes and nostrils and ears lined up with black.

The base can be light green. Now, when the enamel dries, you could cover the saddle with a piece of brown leatherette, and provide the belly band and reins from the same material. Leatherette banding, or strapping, makes reins, etc. for the head. It can be fixed on with leatherette-covered studs.

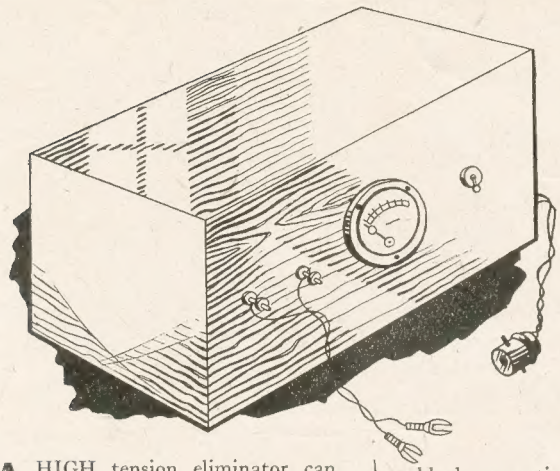
Remember that such a toy is coming in for rough usage possibly, so be sure to make all joints strong and rigid. Then the whole thing will last any youngster years.

A Polish Outfit for Handymen

HOW often we are disappointed in finding a good piece of work spoiled in the finishing operations. Nothing can beat a nicely polished article in wood, glossy and smooth, pleasing to eye and fingers. Evidently it is a matter which readers realise, too, because we frequently receive enquiries about a suitable finish to their woodwork and where they can get the necessary materials. A complete new kit specially for the handyman has been put on the market recently by Rustins of Waterloo Rd., Cricklewood, London, W.C.2. We have tested out its contents and can recommend them for all jobs where a really professional finish is desired. The Outfit contains polish, oil, spirit, colour stain, stopping, filler varnish, thinners, wadding and cloth for rubber, glasspaper and full instructions how to go to work. If the work involved has already a coat of varnish, a solution for removing it is also included.

How the amateur radio enthusiast can make

AN L.T. MAINS UNIT



A HIGH tension eliminator can provide H.T. current from the mains so a H.T. battery is not required. The unit described here functions in much the same way as regards low tension supplies. For reasons which will be described, it is best to retain one of the accumulators previously used, but as this does not require to be taken away to be charged, all mains operation is obtained. This should prove useful to many users of battery receivers.

Panel and Case

Fig. 1 shows dimensions of baseboard and panel. None of the dimensions is critical, but a cover consisting of top, back, and two sides should be made to fit over the panel and base. If the measurements given are followed, this cover should be 8ins. wide, 4½ins. high, and 5¼ins. deep, inside.

Before any wiring is done, panel, base and cover may be varnished. When the unit is finished, the cover can be fixed in position by screwing it along the sides and rear edge of the baseboard.

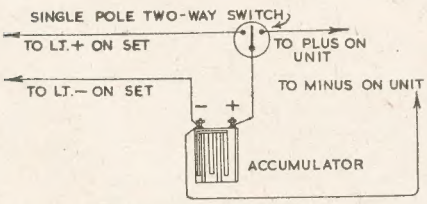


Fig. 1—The battery circuit

Plywood is quite suitable for the panel, and holes should be made for the terminals and on-off switch. A hole about 1⅜ins. in diameter will also be required for the meter.

Electrical Parts

The on-off switch must be a proper one intended for mains use. It is worth while marking the panel to show the "ON" and "OFF" positions.

A low tension rectifier is required, and even the smallest makes will do. One can be bought cheaply. It does not matter whether it is intended for 6-or 12-volt operation, as it will not be called upon to deliver its full output. Positive and negative terminals are frequently shown by red and black, respectively. Often a sign like a small "S" is used to denote the "A.C." (alternating current) terminals.

It is worth while fitting the meter because they are now so cheaply obtainable. One reading up to 1 or 2 amps. is required; or even up to ½amp. is suitable, as a greater output than this will not normally be wanted.

The transformer should have a secondary giving 4 to 6 volts. Most transformers are suitable for this, and any but the very smallest will do. Very small transformers will get rather hot after a long period of use.

A length of twin flex fitted with a mains plug or adapter will also be needed. An insulated staple can hold these to the baseboard so that connections are not pulled off.

Construction

There are very few connections and all are shown in Fig. 1. The parts should be screwed down. The rectifier will usually be on brackets. Mark the terminals plus and minus and connect them correctly to the rectifier.

If a 2-volt accumulator is connected (be sure to observe the correct polarity) and the unit plugged into the mains, the meter should show ½ amp. or so when the unit is switched on.

If the unit delivers less than ½ amp. this does not matter. It will merely be necessary to operate it rather longer to keep the accumulator charged. On the other hand, up to 1 amp. or more is quite in order except for the very small accumulators. It is best not to exceed the rate which will be found marked on the battery.

If the unit charges at an excessive rate (as it may if the transformer delivers a fairly high voltage and current), then a resistance should be connected between the meter and minus terminal. Only a few ohms will be necessary. A resistor can be bought or made from thin iron wire.

The more resistance in circuit, the lower will the charging rate become. Therefore, a few trials will immediately show what length of wire to use.

If either rectifier or transformer shows the slightest sign of becoming warm after a long period of use, drill a row of ½in. holes along the back of the cover, near the bottom, with a similar row near the top. Air can then circulate inside.

Using the Unit

The unit delivers direct current. Despite this it should not be used to supply the receiver direct. There are two reasons for this. (1) Battery-operated valves require an almost

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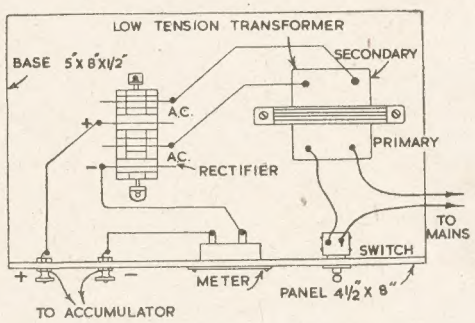
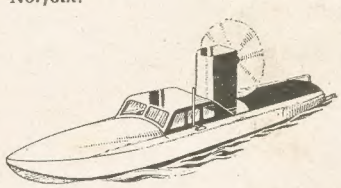


Fig. 1—Wiring plan of the unit

Design Sheet for a

MOTOR DRIVEN HYDROPLANE

This interesting working model is made from the design sheet presented with this issue (No. 2764). A kit of parts including motor costs 12/3 from Hobbies Branches or 13/- by post from Hobbies Ltd., Dereham, Norfolk.



Bottle Lamps

I HAVE several odd shaped bottles, and would like to make table lamps of them. Unfortunately I do not know the best method of making a hole at the base of the bottle for the wire to go through. (W.B.—London, W.1.).

THE most practical way of boring a hole through a bottle or the like, is to grind it out, using a piece of copper rod or any fairly soft metal, a little smaller than the diameter of the desired hole. Put the metal in a small hand drill and use the coarsest grade of carborundum powder as an abrasive.

To guide the drill, fix a piece of wood with a hole in it, over the bowl or bottle in the required place. The wood can be fixed with Acrabond or other adhesive, or some plastic wood could be used instead.

Put some carborundum powder in the hole and on the "drill"; moisten with water and rotate the drill briskly, using only moderate pressure. Wash out the hole with clean water and recharge the drill as soon as it ceases to cut freely. Patience is needed to get the hole through, but it is the safest and best way to do the job.

Shellac for French Polish

IN what proportion should I dissolve shellac in methylated spirit to make french polish? (W.H.—Ballsbridge).

TO make french polish, dissolve 6 ounces shellac in 1 pint methylated spirit. This is the usual proportion. Shellac is sometimes rather long in dissolving and to expedite the process, proceed as follows.

Break the shellac up very small, lay it on a sheet of paper and leave in a warm spot until it is quite dry and all moisture gone. Place the shellac and methylated spirit in a gallipot and stand in a pan of water. Cover the top of the gallipot with muslin, or some similar thin porous stuff. Now bring the water to the boil to help the shellac dissolve. As the spirit is highly inflammable, no naked light should be brought near the pan.

Linseed Oil

HOW does one convert raw linseed oil into boiled linseed oil? (W.H.W.—Camberley).

BOILED linseed oil is prepared as follows. Place the linseed oil in an iron pot of sufficient capacity to prevent it frothing over. To every gallon of the oil, add the undermentioned quantity of driers finely ground.

(A) 3½ ounces red lead and 3½ ounces litharge. Mix with the oil gradually and stir with an iron rod. When frothing ceases do not let the temperature rise above 22°C. About 2 to 3 hours boiling is enough, when the oil should be poured into a vessel to cool.

In case of difficulty in buying the driers, the following alternative could be used.

(B) The red lead as above, and sugar of lead in place of the litharge.

Electric Guitar

I HAVE been interested for some time now in constructing an electric guitar, but I cannot find any books which describe their construction. (D.R.—Droylsden).

THE guitar may be ready-made or constructed along the usual lines with one or several strings. An electrical unit must then be added, several methods being possible. A small microphone mounted on the sounding board is often used. If maximum volume is desired, the microphone may be mounted in such a position that the bridge supporting the guitar strings may be secured to it. A few moments testing will immediately show the different results

(*Continued foot of page* 29)

You can use an old tin to make A SIMPLE OIL CAN

DO you happen to need an oil can? Providing you have an empty insecticide powder "puffer" tin and an old pencil brush ferrule, a simple useful oil can may be made, as shown in the illustration. The "puffer" tin mentioned, of course, is the new type of container for D.D.T. and similar powder.

There is a small outlet hole in these tins, and the sides of the tins are bulged out so that, by compression, air is forced out of the hole, carrying with it a jet of the powder. Thus, the "dusting" of clothes, corners, etc., is much facilitated.

A Suitable Spout

These "puffer" tins are not unlike the body of an ordinary oil can. By fitting a "spout" over the outlet hole, the tin container can be converted into a small oil can. This spout is the tin ferrule fitted to a pencil brush. A pencil brush, of course, is a fine type of brush used by artists, and it is quite likely that you have an old one.

If so, carefully withdraw the ferrule from the handle and remove the bristles. One way to do this is to heat the end of the ferrule to burn the hairs which, in an ash form, can be poked away with a darning needle or something similar.

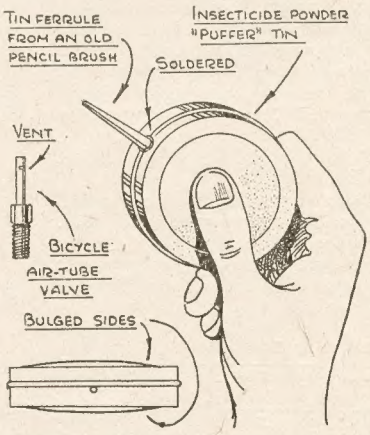
When you have cleared the ferrule, make a suitable hole for it in the powder tin so that the ferrule can be inserted via the inside.

Air Tight

It should be explained here, perhaps, that the lid on the puffer tin is a tight air-tight fixture, but can be removed. The original outlet hole may be enlarged with a drill. Insert the ferrule, point foremost, through the hole to project as shown, then proceed to solder it at the shoulder. When the lid is replaced tightly again, the oil can is ready for filling.

Filling is done by suction. Simply press the tin sides and, dipping the end of the spout into the oil bottle, allow the tin sides to bulge out. This sucks a quantity of oil into the tin, and by repeating this action, the tin will soon become partly full. It should not be quite full of oil, by the way, otherwise the oil will squirt out.

The least pressure suffices. Pressure controls the flow. You can have the oil coming out drop by drop, or in a jet. If you find the oil is likely to run out of its container when the latter is left lying on its side, the spout tip can



be fitted with a stopper, such as a tack or a piece of matchstick.

If you do not have a metal ferrule to use, an alternative is the air-valve from an old bicycle inner tube. This can be affixed with a nut, then soldered.

The outlet hole (air vent) in this case is at the side of the valve, as shown. To prevent the oil running out, which is quite unlikely, a piece of rubber valve sleeving can be forced over the stem to cover the hole.

Full-size patterns are on page 35 for making this

NOVEL WORKING TOY

THIS week we provide patterns (on page 35) for a novel cut-out moving figure, an item which should amuse our younger readers. As can be seen, two men are supposed to be at work. One is holding a stake of wood. The other is holding a heavy mallet. By moving a control arm, the man with the mallet moves backwards, thereby raising the mallet.

What Happens

Now, as this man moves back to give momentum to the blow of his mallet on the stake, the other man rather sticks his head in the way. In this position, one wonders if it is the man's head, or the stake, that is going to be hit. "Some day I'll really give it a good cosh, mate!" the man with the mallet is saying.

It looks like he means his helper's noddle, and to see just what happens, everybody simply has to move the control arm so the mallet comes down again. However, a reversal of what took place before occurs. The mallet just misses the man's head and taps firmly upon the stake he is holding. So, you see, it is just a simple moving novelty—a new type which is sure to please.

As a Calendar

If desired, you can make a calendar out of the novelty. It is only a matter of adhering a suitable calendar pad to the space provided. The whole thing can be affixed to a wall, using a couple of roundheaded brass nails.

When prepared and fixed up on the wall, you will have some fun watching visitors when they suddenly notice the novelty—it will attract the eye much as the "drinking ducks" we see in the windows of many shops at present. People are very curious. Everybody will want to move the control arm to see what happens. Such a calendar novelty is sure to come in for quite a lot of attention.

Suitable for a calendar date pad

You could make it up for the New Year, or ignore the calendar idea altogether and make the novelty for holding in the hands.

Fretwood or Plywood?

The patterns are pasted down on $\frac{1}{8}$in. wood. This should be plywood, if possible, or well seasoned fretwood. Stiff cardboard could be used, but the pivots of the moving parts need to be small eyelets, fixed with a punch. If you have roundheaded paper fasteners (these are made from thin brass, with tags which bend over easily) in hand, these can be used for cardboard cut-outs. In the case of plywood or fretwood, of course, panel pins are used.

Owing to lack of space, the control arm is drawn through a pattern. You need to take a tracing of this arm, therefore, after which the figures and support are pasted down on the wood or cardboard, then cut out with a fine fretsaw.

Holes for Movement

When cut out, make holes in the figures with a fretwork drill point (for panel pin pivots) or a twist drill (for eyelets or fasteners). The holes for the pivots in the control arm and the support should, in the case of panel pin pivots, be done with a finer drill.

The reason for this is that the points of the nails must be a firm fixture in the arm and support, with the stems free in the figure pivot holes. Thus, the nails will not work out.

Attach the figures to the arm first, then the figures to the support. This completes the novelty which is ready for use—or attaching to a wall. There is no need to colour the edges of the wood.

With Date Pad

If you use a calendar pad, select one which is large enough to cover the writing in the panel space. You can only make one of these novelties. If you are a bit of an artist, however, it would be easy to trace an outline of the figures and fill in the details with ink or crayon pencil. This can be easily done on birch plywood, or a stiff white card, using crayon pencils in the former case. Or get a friend to help you who can do it well.

(*Continued from page* 28)

with the microphone in different positions.

If the strings are of metal (steel) an earphone, with diaphragm removed, may be secured below the strings at their point of maximum vibration, the earphone being at such a height that the wires of the guitar are very close to the poles of the magnet. This will give very pure reproduction, although volume is slightly reduced.

The output from the microphone or earphone should be amplified by a radio receiver or amplifier.

Making a Cold Box

I WANT to make some form of cold box of about three cubic feet internal capacity for keeping the milk, meat, etc. reasonably cool. (L.D.—Harlesden).

A PRACTICAL solution to your problem has been sought for over 50 years, and so far none, other than the use of a refrigerator has been found.

The most successful cool box is the old-fashioned "ice-box", which was merely a strong box, zinc lined and heavily lagged on all sides. Ice in block form was placed in a compartment, with provision for the escape of the water as the ice melted. The food stuffs were arranged as near the ice as possible.

Moulds in Gelatine

I AM interested in making small scale ship models, so would you please inform me how you use gelatine for making moulds? (H.P.—Londonderry).

GELATINE can be used for making moulds for small castings—in plaster or the like—under suitable conditions. A model of the desired article is prepared and the location and number of moulds decided upon, according to the shape of the model. Undercut parts should, of course, be avoided.

The model is then placed in a small box or container, with the top edges thereof level with that part of the model where the divisions between the moulds are to come.

A suitable quantity of gelatine is then placed in a clear vessel which is placed in a pan of boiling water. As soon as the gelatine becomes liquid, it is poured into the box and the model held in place while the gelatine cools and sets. The surface is then coated with grease, and the remainder of the mould is made in a similar way by placing another box on top of the first, securing the edges with adhesive tape to keep it in place, and the gelatine poured in through a suitable hole or holes in the top.

As gelatine dissolves with heat, its use for moulds for lead castings is impracticable.

The second article on the simple hobby of making

STENCIL XMAS CARDS

AS explained in the previous article, all stencils are cut from a thin film. The cutting tool used by the writer was a sharp-pointed penknife, such as the type shown at Fig. 3. Straight lines are best ruled, with curves done free-hand. For neat and true cutting, the film should be fixed with thumb tacks to a drawing board and a small wooden or metal T-square used for guiding the penknife blade.

When cutting, make a light score first, then make a second cut, pressing more heavily on the blade. The precautionary scoring prevents the likelihood of the blade suddenly slipping across the smooth film surface, thus undoing perhaps, a lot of patient work.

Do not wet the tip of the blade in order to "lubricate" it and avoid wetting the coated surface of the undeveloped film, if you use it, as water affects the emulsion, causing it to become soft and swollen.

Cleaning Film

When the stencil has been cut, that is to say, when all the "black" portions have been removed, the film is laid on a tin tea-tray (or anything similar) and washed with an old nail-brush, using hot soapy water. The water, however, must not be too hot, otherwise the film will wrinkle. Have the water luke warm and allow the film to soak in it for a few minutes prior to using the brush.

The emulsion comes away easily enough, but keep the film flat on the tray bottom. Scrub one surface gently, taking care not to press too heavily in case some of the "ties" in the stencilling are broken. Scrub the reverse side, then hold the film up to the light; minute traces of the emulsion will doubtless be revealed and these must be removed to have the film surface free from any stickiness.

Dots in a stencil design, incidentally, are best made with a fretwork drill point. Larger holes can be made with sharp metal-cutting twist drills. Prior to drilling the film, ensure accuracy by piercing the dot positions with the point of the compasses. Drilling should be carried out at both sides of the celluloid, thereby ensuring neatness. After cleaning a stencil, some dots may need to be cleared with the drills.

Stencilling Brushes and Inks

Having made a stencil from the film, as explained, a "proof" is printed on plain paper. A proof, of course, reveals small errors and inaccuracies in the cut-outs, and such require touching up with the penknife, apart from the various dots made with drills.

Suitable Brushes

The best type of stencilling brush to use was found to be a typewriter brush. This brush resembles a tooth brush in appearance (see Fig. 6) and is used principally for cleaning the face of type.

The bristles, plus the shape of the handle, makes these brushes more suitable for stencilling than old tooth brushes or proper stencilling brushes, the latter being rather coarse and too large for the finer stencilling you are undertaking. So, obtain type-cleaning brushes, three being sufficient

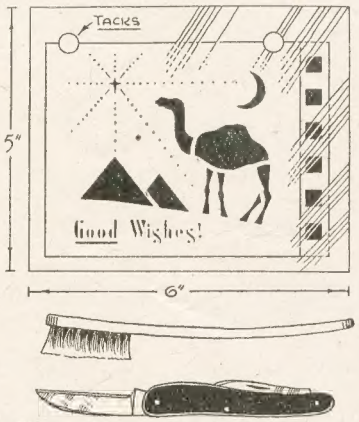


Fig. 3—How to hold the film down, with brush and cutting knife

for your needs, since you will probably not use more than three different colours, such as red, green and blue or black.

You also need three bottles of indelible stamping ink and three inking pads. The latter are easily made from the lids of three ½lb. cocoa tins, hat felt and linen. The lids serve as pans; the hat felt is cut to fit inside, using three layers for each pan. The layers are held together by covering them with white linen, the loose ends and sides of the linen being drawn together with thread at the underside.

Taking a Proof

To take a proof, pin the stencil over a sheet of paper. A few drops of the stamping ink is allowed to soak into the prepared pads until the surface is well covered and damp. A proof is made by rubbing the bristles of the brush on to the (say) red inking pad and then by rubbing the brush over the stencil—using a firm circular movement.

Results seem uneven until the paper is drawn away from the stencil plate. That is why you should not attempt to have the ink filling up the black spaces in the stencil too deeply. A light shade only is wanted. If a deeper tone is desired, more rubbing is necessary, but too much rubbing "lifts" the surface of the paper which, naturally, is damp with the ink. This "lifting" is more noticeable on blotting paper and the loose particles of pulp are apt to clog the cut-outs in the stencil plate. The term "plate" is always applied to a finished stencil, by the way.

Printing a Card

Assuming the "proof" is satisfactory, a "test" card is printed. As stated before, the card paper is the kind used by typists, being sold in reams (480 sheets) in packet form. The writer has suggested "bond" quality white paper, but there are thin cheap-grade "tinted" papers available which, however, you might find too flimsy for your purpose.

Before printing, each sheet must be folded in a certain manner, as shown at Fig. 2, so a ½in. margin of the inside back page section shows at the front. To fold the paper, bring A-A and B-B together and crease the fold with the fingers. B-B is turned over on A-A and a second crease made. The measurements give the position of the creases (see dotted lines).

Place the folded paper on the drawing board. Set your stencil over it. Centre the stencil neatly over the folded paper, then drive in a couple of drawing pins through the stencil so the points just touch the top edge of the card paper (see Fig. 3). The tacks act as a guide for the card paper, keeping it even with the stencil.

The Colours

Having printed the front design in colour (red and green), the inside back greetings matter is printed. The stencil for this purpose is pinned to another portion of the drawing board, of course. The two colours mentioned are suggested because they blend well together, being suggestive of green holly and red berries and thus giving a Xmas flavour and atmosphere to the cards.

It does not matter, moreover, if one colour infringes on the other colour owing to the close proximity of the cut-out spaces in the stencils. You should, however, avoid this overlapping of colour as much as possible.

Having successfully printed one style of card, other types will come easily with you.

(To be concluded)

How the amateur photographer can build
A SIMPLE ENLARGER

WE frequently receive requests from readers asking for information and instruction on how to make an enlarger and, in order to satisfy these, we are publishing details which should enable any reader with a few tools, and a knowledge of how to use them, to produce an enlarger of the horizontal pattern capable of giving very efficient work and many hours' pleasure in attaining what almost every amateur photographer will agree to be the highest achievement of the hobby, i.e., picture making by enlarging.

There are four main sections to an enlarger, each of which has its own particular function to perform. At the same time each is dependent on the others for the successful working of the whole.

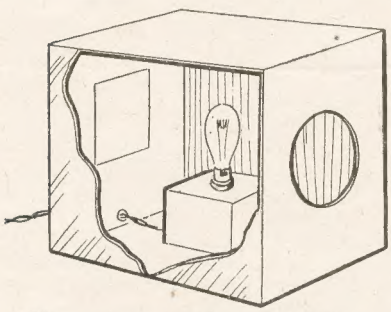


Fig. 1—Cut-away view of the lamp chamber

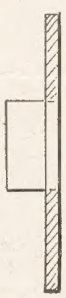


Fig. 2—Section of condenser and panel

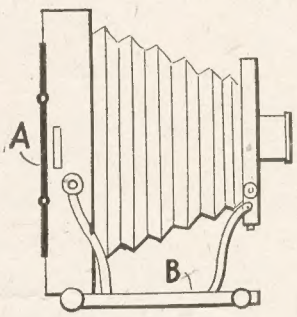


Fig. 3—Showing back, double dark slide (A) and rack and pin on (B)

To illustrate this point, the light from the Lamp Chamber has to pass through the Condenser where the rays are bunched so as to evenly pass through the negative, and be again collected in the Camera or Bellows prior to passing through the Lens and then being thrown and spread out as a picture or image on the screen. It will be seen from this that all the light has to be guided from one section to the next and that none must be allowed to escape.

It is now necessary to describe each section and to give some hints as to its preparation or making. You should also study carefully the illustrations of the parts while reading the instructions, for by doing this, you should get a clearer idea of what is required of the part.

The Lamp Chamber

The Lamp Chamber (Fig. 1) should take the form of a square box about 12ins. to 16ins. each way and made of ½in. planed wood. If you are handy in adapting tin boxes, you might try using one of the usual square biscuit tins.

On one side of the box, cut out a square about 6ins. each way and retain the piece as it must be re-inserted as a door. The opening should, therefore, be wide enough to permit handling the lamp. At the opposite side of the box to this opening a circular hole has to be cut in the centre of the panel.

Condenser

Next let us turn to the Condenser. It is possible to buy a pair of unmounted condenser lenses and to mount them but it is much better to buy the pair already mounted. Obviously this will save a lot of work and the mounting is likely to be much more accurately done. If your negatives are all of one size, say, 3¼ins. by 2¼ins., then you will want a 4in. condenser. If the negatives are 2¼ins. by 2¼ins., then a 3in. is required.

The size is obtained by measuring diagonally from one corner to the other across the negative. In other words it is only by taking the longest measurement that you will be certain the condenser covers the whole of the negative to be enlarged, and unless "covering" is assured, sharp definition on the easel of the whole of the image is impossible.

These condensers can usually be obtained from any recognised photographic dealer and, of course, at varying prices according to size and condition of the mounts. Round about 25/- is a fair price for a 4in. In any case the condenser must be purchased before much work can be done or even started on the enlarger. Be very careful to measure accurately the outside of the condenser.

Cut a square piece of wood the same dimensions as the panel of the lamp chamber that is to have a circular hole cut in it. Now with a compass, mark in the actual centre of this piece of wood a circle the same size as the outside of the condenser. Repeat this circle on the back panel of the Lamp Chamber if both edges of the condenser are the same size. If one is smaller than the other, then one of the circles must be equally smaller—it does not matter which.

Be quite certain you have the measurements accurate, then if you cut out the two circles and smooth away the rough edges, you should be able to fit the condenser easily. One side of it goes into the lamp chamber and the other into the separate piece, as seen in the illustrations.

Camera and Negative Holder

The next section to be considered is the Camera or Bellows which is also the negative holder (Fig. 3). It is best to buy a second-hand stand camera. If you can get one with a lens it will save a lot of bother; certainly it should have a double dark slide.

This slide is fitted with sliding sheaths to each flap and between these flaps is a thin metal sheet or a card. This sheet or card division must be cut away, leaving a space the same size as your negatives and in its place two pieces of thin glass between which the negative is to be inserted and kept flat. It will be found that the slide very cleverly fits into the back of the camera and this is important as no light other than that coming through the negative must reach the inside of the camera.

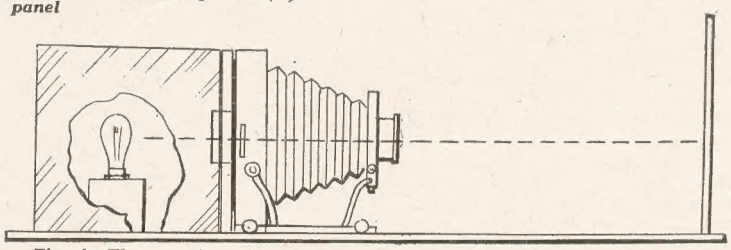


Fig. 4—The complete assembly, dotted line showing line of lamp to easel

Assembly

Place the camera against the condenser so the negative will be immediately in the centre of it. To get this exact it may be necessary to raise the camera bodily by inserting a false bottom under the camera base but it must be done. The rack and pinion movement on the camera must be retained as this is your means of

focussing the image sharply on to the screen.

If you have to purchase a lens separately, then your dealer should be able to advise you what type will do for the camera and how it is to be fitted to the front of the camera. Anyway it is not necessary to have a very expensive one, a short focus is better than a long focus lens, a simple portrait lens will give quite good results, though one is always wanting something better.

Prevent Vibration

At this stage most of the preliminary work can be said to be completed but what must be considered as the most important stage is now reached. All the parts will prove to function with greater ease if they are permanently fixed to a base board of 1in. stuff and fairly weighty to prevent the enlarger shaking or vibrating when in use.

It is absolutely necessary that the centre of the light bulb, assuming that electricity is the illuminant, must be in a direct straight line with centre of condenser and the centre of the negative and the centre of the lens. Thus a perfectly straight line exists from the lamp to the lens stop (Fig. 4). Only by this can you expect even illumination and, when you have got it exactly, the only way to keep it is by screwing each section to the base board.

Firm Base

In order to centre the light and to enable it to be moved nearer or farther from the condenser as needs be, it will be found advisable to mount the bulb on a block of wood which, of course, must be just high enough for the purpose. Also have a loose flex long enough to connect with the nearest bracket in the room and fitted with a handy switch for quickly switching off the light when working the enlarger. It is not advisable to use high power lamps for the work; 40 or 60 watt gives the opportunity for control.

The Easel can be constructed to stand on the same table as the enlarger but it will be found much more convenient to have this hanging on the wall in front of the apparatus.

When purchasing the lens buy also an orange cap to fit it. You will want this when placing the sheet of bromide paper in position on the easel.

It is difficult in these days to give even approximate prices of any kind of apparatus. Undoubtedly the camera is likely to be the most expensive item especially if a lens is included. But you can often see such an article in the secondhand window of a dealer or might even come across one at an auction sale of oddments. One or two pounds spent on a good article is less expensive than a few shillings on a piece of apparatus that is beyond repair.

How the handyman can understand thicknesses in STANDARD WIRE GAUGES

MOST readers, at some time or other, are often at a loss to know the exact thickness of a wire specified, by its standard wire gauge number, for a certain job. Not possessing a gauge, the numbers are just meaningless, yet so much depends on using the proper thickness of wire. Various gauges of enamelled or cotton-covered copper wire are used in making tuning coils, transformers and electro-magnets. Plain wire is generally used in making bird-cages, letter-box baskets, soap holders, cake trays, toasting forks, etc. In practically every case, the s.w.g. number is mentioned.

Converting Sizes

The purpose of this article, therefore, is to help all those readers who are apt to be puzzled by the s.w.g. numbers of wires, particularly the wires they are liable to use, or desire to use, from time to time, from No. 1 up to No. 30. So far as radio components are concerned, a great deal depends on using the correct thickness of wire, apart from the amount, because thickness effects inductance and resistance.

Thickness is not so important in general wire-work, but still, one likes to be able to use the correct thickness of wire recommended. Sometimes the thickness is stated in fractions of an inch, which is very helpful, because the reader has something tangible to work on. He can use a rule to determine the thickness of the wire—an ordinary rule, with 1/16in. divisions.

A standard wire gauge chart, giving the approximate thickness in fractions of an inch is, therefore, sure to be welcomed by numerous readers. Such a chart, based on a standard wire gauge, is given in the adjoining panel.

S.W.G. NUMBER	*FRACTION OF INCH*
No. 1	*19/32in.*
No. 2	*5/16in.*
No. 3	*1/4in.*
No. 4	*15/32in.*
No. 5	*7/32in.*
No. 6	*3/16in.*
No. 7	*10/64in.*
No. 8	*5/32in.*
No. 9	*9/64in.*
No. 10	*1/8in.*
No. 11	*7/64in.*
No. 12	*3/32in.*
No. 13	*5/64in.*
No. 14	*(between size)*
No. 15	*(between size)*
No. 16	*1/16in.*
No. 17	*3/64in.*
No. 18	*(between size)*
No. 19	*1/32in.*
No. 20	*(between size)*
No. 21	*3/128in.*
No. 22	*(between size)*
No. 23	*1/64in.*
No. 24	*(between size)*
No. 25	*1/128in.*

NOTE: Sizes, from No. 25 to No. 30, become too difficult to show by the inch marking. No. 30 is the thickness of a fine human hair. To prevent any confusion, there are several between sizes, which are indicated in parentheses.

For the benefit of readers who do not understand fractions of an inch, it should be stated that an inch is divided into four quarters, and the quarters halved, which gives eighths. Thus, a ¼in. contains two ⅛ths of an inch. An ½in. is halved to give two 16ths of an inch. By halving 1/16in., we get two 32nds of an inch. By halving 1/32in., we get two 64ths of an inch, and by halving 1/64in., we get two 128ths of an inch.

How to Compute

So, to give a proper fractional size, we mentioned the number of 16ths, 32nds and 64ths that may be necessary. There are, for example, four 32nds in an ⅛in., but that being so, we do not write down 4/32in. We say it is an ⅛in.

Assuming, however, the size is one 32nd more than ⅛in., we take into account the number of 32nds in an ⅛in. and add the extra 32nd to such a number, making five 32nds, which is written with a fractional mark (/) thus: 5/32in. This also applies to 64ths and 128ths of an inch.

A much more convenient way of indicating the fractional dimensions would be to use millimetres. Few readers, however, possess millimetre rules, and the next best thing is a common rule. The use of this rule, in conjunction with the chart provided, will give a fair idea of gauges of wire recommended for a particular job.

General Sizes

Reference will show that No. 19 s.w.g. wire is half of 1/16in. in thickness, because 2/32in. equals 1/16in. Respecting the finer gauges, from No. 25 up to No. 30, you have a good idea of the approximate thickness. No. 30 is an extremely delicate gauge of wire, like the fine strand of sticky substance used by house spiders. Hitherto, perhaps, you may have thought that, having a high number, the wire must be very thick, The chart shows that the thickness is the other way round.

Tie rack and box container are fitted to this useful DRESSING MIRROR

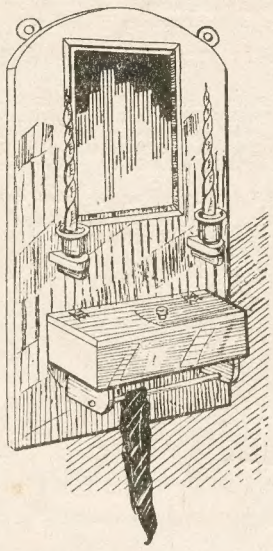


Fig. 1—A practical and ornamental article

THE fitment shown in Fig. 1 should form a useful addition to the small bedroom. It is a mirror frame of modern design having a useful mirror with sockets each side for fancy candles. Below the mirror is a two-compartment box for soft collars, studs, etc. Below this again is a tie rack formed by a stout rod between the two brackets which support the box.

If, instead of the candles each side of the mirror, two small electric bulbs be arranged, then the brackets supporting them could be placed higher and on a level with the centre of the mirror.

The whole fitting would look well in either oak or mahogany, and if any choice is possible these days, the wood should match the room.

If oak is used it should be finished with a coating of medium-light stain and then either wax-polished or french-polished. If mahogany is used, a coating of dark mahogany stain should be applied finished with french polish.

A board measuring 21ins. by 12ins. will be chosen, and the simple shaped top marked out and cut with the fretsaw. The centre from which to strike the arc forming the shaping will be set 9½ins. down from the top edge, and when the fretsaw has done its work, the edges must be cleaned off.

The position for placing the box can be got from Fig. 2, where the brackets beneath it are also shown. The side view of the fitment is also shown in Fig. 2, with the lid of the box open.

From Fig. 4 it should be possible to set out all the pieces which go to make up the box, and when it is done and put together it should be screwed to the main back with countersunk screws from behind. The lid fits on the box flush on all sides and is held to the back with either plain or ornamental hinges as seen in Fig. 3.

A pair of simple shaped brackets will next be cut to the outline given in Fig. 4, and with ⅜in. holes bored or cut with the fretsaw to receive the ends of a length of round rod which is glued in. The brackets and the rod must be fitted and glued together and afterwards secured under the box.

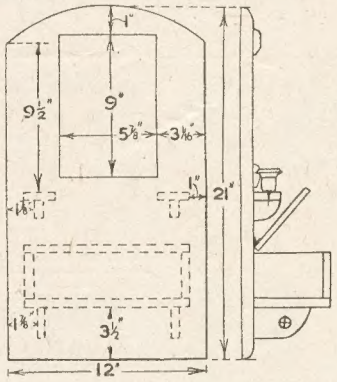


Fig. 2—Front and side view with measurements

The candle brackets will each be made from the two sections shown in Fig. 4. Mark them out accurately, cut and then glue them together in pairs and fix them in position with glue and screws. The metal sockets can be obtained from ironmongers or antique dealers.

The mirror is held in place by first forming a rebate round the opening already cut. Some narrow moulding about ¾in. wide with an overlap of ¼in. round inside the opening would give a good and efficient result. Or some plain pieces of wood with, perhaps, a chamfer planed on one edge would answer equally well. Each length of fillet or moulding should be measured direct from the opening, and the mitres cut neatly with the tenon saw after setting them out with a 45 degrees set square.

After the four pieces have been glued on, and the glue given time to harden, some ⅜in. or ½in. brass fret pins should be driven in at equal distances round the opening and through the rebate strips to give them additional security. All sharp edges should be cleaned off with fine.

In Fig. 5 a sectional diagram of the mirror and beading is given. The backing board to be cut to the same size as the mirror is also shown. Over this backing board a piece of stout brown paper should be glued to keep out the dust. A simple turned handle might be added to the lid of the box, or a strip of wood shaped simply and glued on would answer quite well.

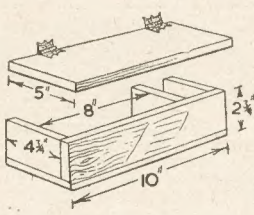


Fig. 3—Details of box

Fig. 5—Section of mirror and method of fixing

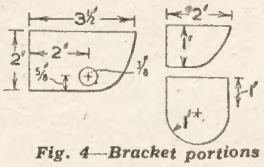


Fig. 4—Bracket portions

It should be mentioned, perhaps, that if a mirror of exact size to fit the opening shown here cannot be obtained, then it would be quite a simple job to mark round one smaller or, perhaps, one a little larger.

Mains Unit—(*Continued from page* 27)

exact 2-volt supply and will be damaged if this is only slightly exceeded. Therefore, operation becomes very critical, especially as the voltage output of any mains unit varies with the current taken. (2) Hum may be caused by the fluctuations in the supply, even with smoothing.

It is cheapest, safest and best, therefore, to retain an accumulator, which is connected as shown in Fig. 2. When the single pole switch is thrown to the left, the receiver can be operated as usual. When turned to the right, the current taken from the accumulator is replaced by the mains unit.

When the mains unit is not required it is switched off, of course. It will not be necessary to use it every day—or even every week, unless a very large receiver is employed. But whenever the accumulator shows any sign of being discharged, the unit can be switched on to bring it back to full power.

If never allowed to run right down, a single accumulator will last for many years, especially if it is a fairly large one in a glass container, containing free acid. Though good, jelly and celluloid accumulators are inferior to the older type where size is unimportant. The accumulator should be looked at every few months and a little distilled water (obtainable from chemists) should be added if necessary.

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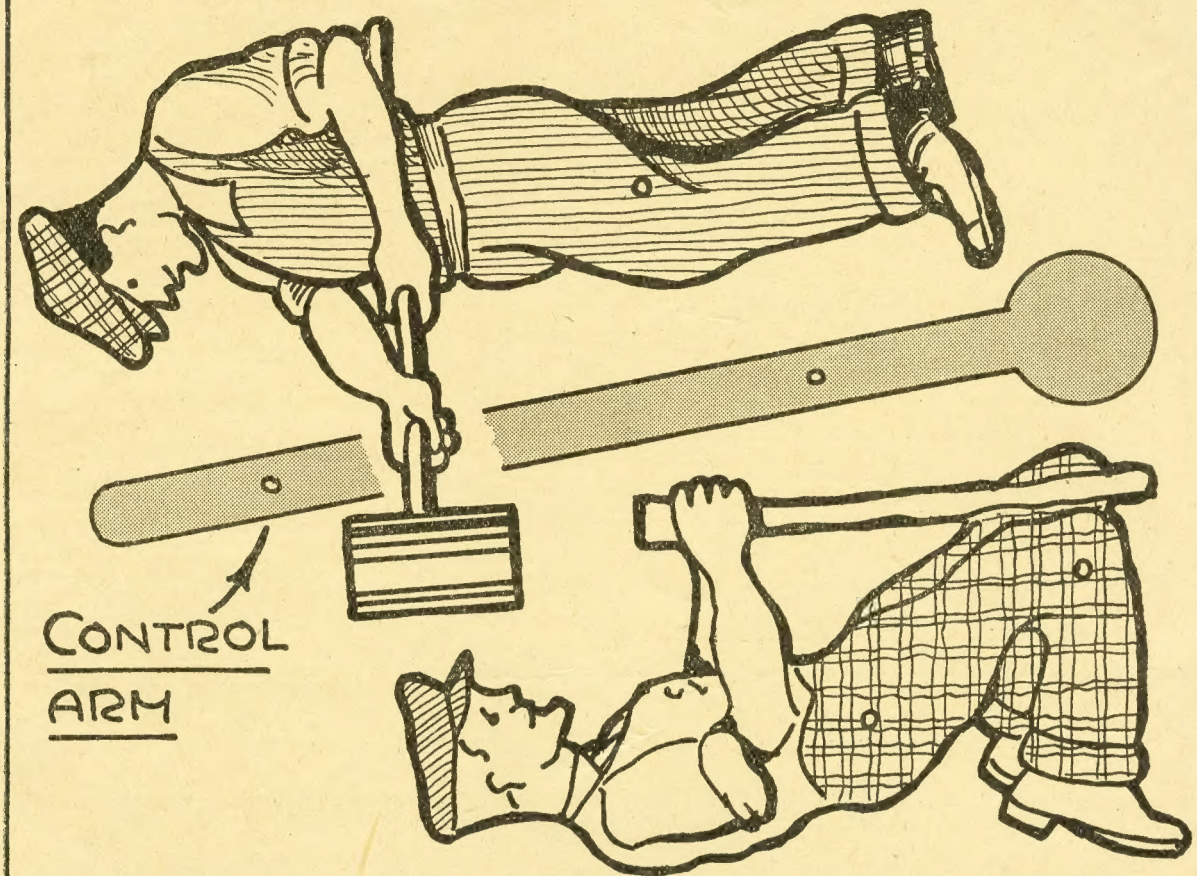

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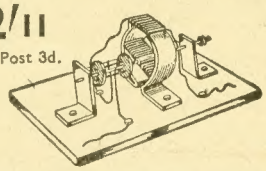

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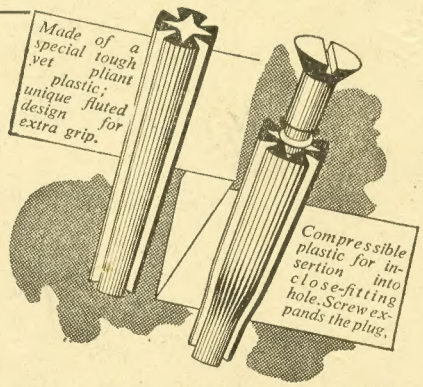

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